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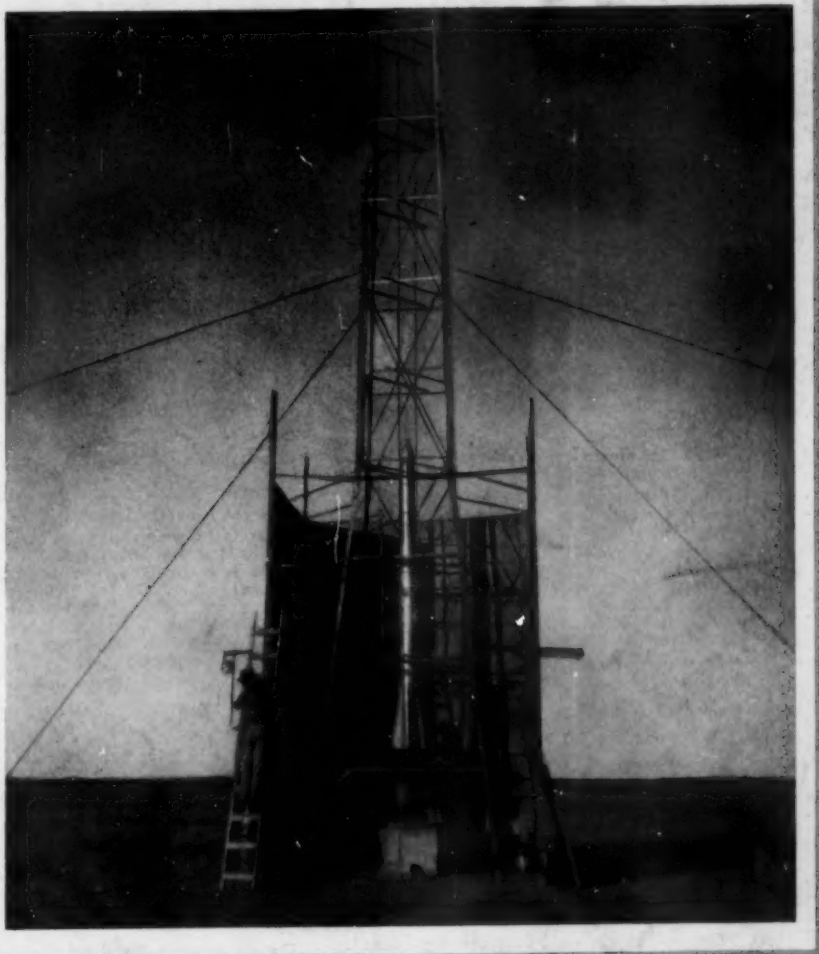
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



JANUARY 4, 1936

Headed for Stratosphere

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A SCIENCE SERVICE PUBLICATION

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VOL. XXIX *No. 769*

The Weekly Summary of

Current Science

Published Every Saturday by

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DO YOU KNOW?

Onions can produce more of their tear-wringing oil when grown in hot temperatures.

Iron alloys are among the newest and most striking materials used in decoration of buildings.

Fighting the recent malaria epidemic in Ceylon, over 14 tons of quinine were used in six months.

A Russian sculptor is designing a group representing Stone Age people of China 400,000 years ago.

An astronomical observatory which once stood on Mont Blanc is abandoned, but a weather station is still maintained on the upper slope.

Government scientists who studied Turkish towels reported that thick, heavy towels wear longest, but lighter weight towels dry the skin faster.

Pocket gophers are multiplying alarmingly on eastern Montana stock ranges.

Nine out of ten of India's inhabitants depend entirely on agriculture for their living.

India has about forty studios making moving pictures in various Indian languages.

By pasteurizing certified milk, it is possible to obtain fluid milk that is practically sterile, one company reports.

A new vaccine which promises to prevent sleeping sickness in horses is being tested by the U. S. Bureau of Animal Industry.

Since the European War, there has spread in Great Britain an ultra-mild form of smallpox, called "variola minor," which is described as not being fatal, disfiguring nor loathsome.

WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

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SEISMOLOGY

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ZOOLOGY

What animal can "see" light with its entire body surface? p. 9.

MEDICINE

Abandoned Drug Is Antidote For Sleeping Powder Poison

Overdoses of Veronal and Luminal Are Counteracted By Powder From "Fish Berries" of East India

AN ANTIDOTE for otherwise fatal poisoning from overdoses of commonly used luminal, veronal and related sleeping powders has been found in picrotoxin, a drug formerly much in vogue but little used in recent years.

Two human cases in which the new treatment proved its worth and animal experiments leading to its use were reported by Drs. T. Koppanyi, J. M. Dille and C. R. Linegar, Georgetown University Medical School, to the American Association for the Advancement of Science.

Physicians will soon be able to use this new treatment in rescuing from death those who inadvertently or with suicidal intent take large doses of the barbiturate sleeping powders.

The patients on whom the new antidote was first used were both elderly persons, a man and a woman, patients of Georgetown physicians, Drs. Wm. S. Murphy and Connolly. The woman had taken luminal, the man amytal, both in very large doses, and both patients were absolutely paralyzed from the overdose of sleeping powder. The woman responded very favorably to picrotoxin, Dr. Koppanyi reported. She came out of collapse, began to move, eat, drink and even to talk, though not coherently. Unfortunately, she died of lung infections which had set in before the picrotoxin treatment had been started. Blood tests, however, showed that the amount of luminal in her body was progressively decreasing in relation to the improvement in symptoms noted following the picrotoxin treatment.

Man Seen Early

The man was fortunately seen very soon after he had taken the overdose of amytal. Picrotoxin treatment was started immediately and continued for two days. The patient progressively improved and after a final fairly large dose of picrotoxin suddenly showed what Dr. Koppanyi calls the "awakening effect of picrotoxin," began to move about, asked rational questions and from then on made an uneventful and complete recovery.

Picrotoxin, the substance which promises to save victims of overdoses of modern sleeping powders, is not suitable for treating all cases of poisoning due to narcotics, Dr. Koppanyi warned. In morphine poisoning, for example, picrotoxin produces no "awakening effect" and tends to make the condition of the subject worse. Before starting this treatment, the physician should find out whether the poisoning is due to sleeping powders like veronal or amytal, Dr. Koppanyi advised. This may be learned either from the history of the case or by performing the Koppanyi test for these compounds.

Picrotoxin is a bitter-tasting, white crystalline powder found in the famed fish berries of East India, where it got its name from the fact that the natives used it to poison fish. It is a powerful stimulant and formerly was an official drug in the U. S. and British Pharmacopoeias. In former times it was almost without exception put to the wrong use, Dr. Koppanyi explained, being used then to treat epilepsy and St. Vitus' dance, conditions characterized by convulsions which picrotoxin itself has a tendency to produce. It was therefore taken out of the pharmacopoeias and discarded as a useless remedy.

Wisconsin Research

Merit for rescuing it from oblivion and suggesting its new use as an antidote for a certain type of poisoning belongs to Dr. A. L. Tatum and associates of the University of Wisconsin, Dr. Koppanyi declared. These investigators first showed that picrotoxin shortened the recovery time of animals poisoned by the veronal group of sleeping powders.

Dr. Koppanyi and associates showed among other things that very large doses of picrotoxin may be necessary to counteract the effect of the veronal-amytal type of sleeping powder. In very severe poisonings it is necessary to give one animal a dose of picrotoxin large enough to cause convulsions in 300 normal animals. Yet the poisoned animals are so depressed by the sleeping powder that they hardly show any twitches under these terrific doses of picrotoxin. This shows not only that picrotoxin is an effective antidote but that it is safe to use in these cases.

Even more dramatic than its life-saving effect is the "awakening effect" of picrotoxin, Dr. Koppanyi said. At the meeting, he showed moving pictures of animals to demonstrate this. These animals were poisoned not by very large doses of the sleeping podwers, but had had enough to produce deep sleep and unconsciousness. They were lying perfectly helpless on the floor. When moderate doses of picrotoxin were injected, they suddenly awoke and began to move about in lively fashion.

Tests also showed that picrotoxin in some cases actually increases the rate at which amytal and similar sleeping powders are destroyed in the body.

Science News Letter, January 4, 1936

SEISMOLOGY

Earthquakes Reproduced With "Electric Eye"

ENGINEERS now have a new weapon with which to combat one of their most powerful enemies—the earthquake. A machine devised at the

DUPLICATES EARTHQUAKES

This machine makes it possible for the first time to duplicate in the laboratory the motions of destructive quakes directly from seismograph records. In the foreground Arthur C. Ruge, research associate, who designed the machine, is adjusting the optical system and electrical "thinking" device, which has an electric eye that follows the wavy outline of the shadowgraph of an earthquake record. The white shadowgraph shown here is a seismograph record of the Long Beach, Calif., quake of 1933.

Massachusetts Institute of Technology, and described before the meeting of the Seismological Society of America by Arthur C. Ruge of the Institute staff, makes it possible for them to reproduce at will, on a small scale, all the wracking movements of any earthquake that has been recorded on a seismograph. Models of buildings, set on this machine, are given a chance to display points of strength and weakness, and the engineers can turn the knowledge they thus obtain to account in perfecting the resistance of their structures to the thrusts and pulls of an unruly earth.

Machines constructed for this purpose in the past have not been able to follow the actual movements of an earthquake at all accurately, due largely to imperfect control mechanisms. Mr. Ruge's device consists essentially of an electro-magnetic control over a valve, that in turn determines the rate and amplitude of motion of an oil-driven piston moving the shaking table. The current that operates the control is increased and diminished by a photo-electric cell, or "electric eye," in response to a controlling cam cut out of paper, in the exact shape of the earthquake's record curves. A spot of light constantly "watches" the irregular edge of the cam.

Since each historic earthquake has its own characteristic shape and record, any earthquake can be called back at will and made to dance again in the Institute laboratory, simply by cutting out a shadowgraph of its record.

Science News Letter, January 4, 1936

BACTERIOLOGY

Find New Form of TB "Germ" In Breeding Experiments

ARTIFICIAL breeding experiments with the tuberculosis "germ" which resulted in the discovery of a new form of this bacillus and shed fresh light on the disease were reported to the Society of American Bacteriologists by Drs. Ralph R. Mellon, Philip J. Almaden and Ruth D. Richardson of the Western Pennsylvania Hospital's Institute of Pathology, Pittsburgh. Dr. Mellon is also director of the medical research affiliate of the Mellon Institute, which sponsored this work.

The new organism produces in experimental animals a kind of reaction not produced by conventional forms of the tubercle bacillus. This kind of reaction is known technically as non-caseating, meaning that the tissue is not killed en masse by the infection. Since this tissue-killing is one characteristic of the disease, its absence has made diagnosis difficult and uncertain in some cases, Dr. Mellon explained.

"Preliminary studies already conducted in suitable patients have illuminated these uncertainties for the first time," he said, "and to an extent that gives promise of still wider application of this knowledge."

Another of the unique and important characteristics of the new bacillus is the fact that it is either non-pathogenic or produces a benign form of the disease in highly susceptible animals. This suggests that in part, at least, resistance to tuberculosis may be acquired by people as a result of infection with the newly-discovered organism rather than from repeated infection with small amounts of the usual disease-producing form, as has been previously supposed.

The breeding of this new tuberculosis "germ" may aid diagnosis of the disease in still another way, it appears from the report of the Pittsburgh investigators. This new organism can produce a tuberculin that is different from the tuberculin produced by the human, bovine or avian bacillus. Tuberculin is a chemical product of the tuberculosis "germ" specific for this organism and used for diagnosis of the disease.

"It becomes distinctly possible that patients reacting to the new type of tuberculin still have a form of tuberculosis not detectable perhaps with the old type," Dr. Mellon said.

Science News Letter, January 4, 1936

PHYSIOLOGY

Turnips Found Effective As "Carrier" for Iodine

WE MAY all soon be eating turnips as a means of getting goiter-preventing iodine into our systems, just as we now eat spinach for the vitamins it contains. Or if we live in the South, we may combine the two benefits in a dish of turnip greens.

At the meeting of the American Association for the Advancement of Science, Dr. Warren B. Mack told of experiments with many kinds of vegetables, to see which would make best use of iodine applied with fertilizer to the soil. He found turnips to be most efficient, increasing their iodine content more than a hundred-fold when plenty of that necessary element was available in the soil.

Science News Letter, January 4, 1936

CHEMISTRY

Chemistry Aids Farmers In Many Varied Fields

CHEMISTS are the farmer's allies in a long series of activities, many of which would hardly be guessed at by the uninitiated, Dr. Henry G. Knight, chief of the bureau of chemistry and soils, U. S. Department of Agriculture, indicated in his annual report.

Chemical research for the improvement of fertilizers, and for the better understanding of legume-crops' fixation of nitrogen from the air, chemical work toward the improvement of poison sprays to kill off insect pests and fungus diseases—these are obvious points of contact between chemical science and agriculture. But even more numerous, Dr. Knight's report shows, are chemistry's good offices in finding new uses for agricultural products, and in improving old ones. Alpha cellulose from cornstalks, gas for lighting and heating from barnyard wastes, industrial solvents from by-products of corn processing, are only a few of the possibilities on which research is actively in progress at the present time. An investigation into the color of apples turned up a piece of basic information that may be of use in the seemingly remote field of corn breeding. Studies of enzymes have application in such dollars-and-cents matters as tanning of hides and storage of eggs.

The list is long, and might be longer, Dr. Knight emphasizes, if we only had more basic chemical knowledge to apply to immediate problems. For this reason he stresses the need not only for applied chemistry but for fundamental research in "pure" chemistry—which is never far from application, once its results come into the clear.

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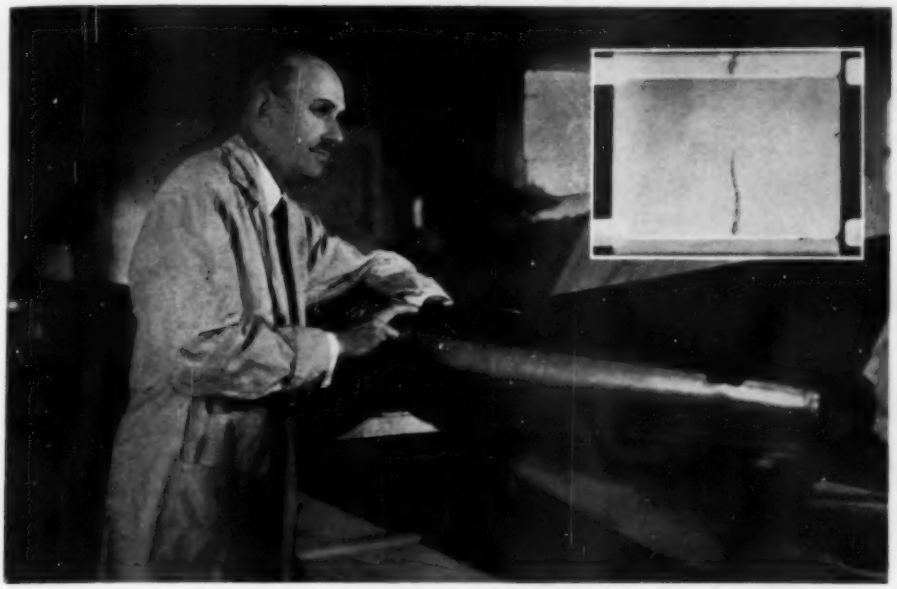
About 98 per cent. of the cashew nuts sold in this country come from India.



MAKING READY FOR FLIGHT

Prof. Robert Goddard, of Clark University, inspecting one of the great rockets with which he has been experimenting in his Roswell, New Mexico, laboratory. The inset is from a motion picture film and shows the rocket in vertical flight.

MEDICINE

Discovery of "Germ-Eater" For TB Bacillus Claimed

DISCOVERY of a bacteriophage or "germ-eater" for the bacillus that causes tuberculosis has been reported by William Steenken, young bacteriologist at Trudeau Research Institute for Tuberculosis.

Trials are now being made to determine the new phage's effectiveness as a treatment for tuberculosis. It is too early to know the value of the new substance, but there seems a possibility that it may prove to be the long-sought "cure" for the white plague.

Since the discovery of bacteriophage in 1918 by Prof. F. d'Herelle, the eminent French-Canadian scientist, a search has been in progress to obtain a principle of this sort which would be active against man's great enemy, the tubercle bacillus. Success seems to have crowned Mr. Steenken's efforts along this line.

Paralleling the observations of Prof. d'Herelle that bacteriophage destroyed the dysentery bacillus by a process known as lysis, Mr. Steenken has noted lysis or destruction of the tubercle bacilli in cultures of them kept at a certain degree of acidity. Scientific details of the investigation were reported by Mr. Steenken in a preliminary note to the Society of Experimental Biology and Medicine. (*Proceedings*, Nov. 1935.)

The phage or lytic principle obtained by Mr. Steenken is said to convert virulent types of tubercle bacilli into avirulent harmless ones, when in the test tube. There seems to be a possibility that the lytic principle may do the same thing to tubercle bacilli in the body, and experiments are now under way to determine this point.

Mr. Steenken's bacteriophage has not yet been tried on human cases. Tests on animals, however, already indicate the value of attempting to use it to vaccinate human beings.

Another similar substance with possible value as a weapon against tuberculosis has been isolated by Dr. Hugh E. Burke of New York State Hospital at Ray Brook, near Saranac Lake, N. Y. Working along lines similar to Mr. Steenken's research, Dr. Burke has obtained a substance from organisms other than the tuberculosis bacillus—namely, Bacillus pentaceticus—which digests the starch out of the tuberculosis "germ," leaving the latter in a harmless form. Mr. Steenken's tubercle-bacillus-destroying principle, on the other hand, is intrinsic in the virulent tubercle bacillus giving rise to the avirulent form.

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AERONAUTICS

Rocket Sent to 7,500 Feet At 700 Miles an Hour

See Front Cover

EXPERIMENTAL rocket flight to altitudes of 7,500 feet, with speeds up to 700 miles an hour, were reported by Prof. Robert Goddard of Clark University to the meeting of the American Association for the Advancement of Science.

Motion pictures of his rockets in actual flight were shown by Prof. Goddard, and gathered scientists witnessed on the screen some of the tests which Col. Charles A. Lindbergh and Harry F. Guggenheim saw last September at Roswell, N. M.

The experimental flights, based on five years of research, are designed to provide science with a mechanism for probing the stratosphere beyond the reach of balloons, either manned or without human pilots. Flights to the moon and other astronomical objects have never been considered by Prof. Goddard as a crucial goal in his experiments.

Three needs were cited by the rocket scientist for rocket research: (1) a suitable combustion chamber which can withstand the high temperatures and pressures encountered when the rocket fuel is burned; (2) a means of keeping the rocket in vertical flight; (3) construction of very light weight rockets.

The first two goals have been achieved, Prof. Goddard pointed out. A rocket "motor" has been perfected which yields 209 horsepower per pound of combustion chamber. A superlative airplane engine, for comparison, will give slightly less than one horsepower per pound of weight.

Stabilization in flight, declared Prof. Goddard, is accomplished with a gyroscope which serves to move vanes placed in the rocket's flaming blast.

Working in almost desert country near Roswell, N. M., Prof. Goddard launches his rockets from a vertical tower sixty feet high looking something like the derrick of an oil well.

The whole series of experiments has been highly dangerous. The start is ac-

complished by remote control from a point more than 1,000 feet away from the launching tower.

The rockets, said Prof. Goddard, while attaining the high velocity of 700 miles an hour have a low starting velocity. Delicate control adjustments on the rockets have not been injured or disarranged in some of the more recent tests.

Prof. Goddard's research is financed jointly by the Daniel and Florence Guggenheim Foundation and the Carnegie Institution of Washington while the scientist is on leave from Clark University.

Science News Letter, January 4, 1936

MEDICINE

Propose New Way To Protect Against Infantile Paralysis

Sodium Alum or Tannic Acid Drops in Nose Suggested By Rockefeller Scientists For Next Epidemic

A CHEMICAL method of protecting against infantile paralysis, recommended for trial in the next epidemic of this dread disease, was reported by Drs. A. B. Sabin, P. K. Olitsky and H. R. Cox of the Rockefeller Institute for Medical Research at the meeting of the Society of American Bacteriologists.

The method consists in dropping or spraying into the nose solutions of either sodium alum or tannic acid in suitable strength. The chemicals seem to act as a shield against the disease, by keeping the causative virus from entering the body and reaching the nerve cells in brain and spinal cord.

"Experimentally there is now sufficient basis for a trial in man of these chemicals in the prevention of poliomyelitis during epidemics," the investigators stated.

Tannic acid was first suggested as a suitable chemical for this purpose by Drs. Olitsky and Cox. Sodium alum was advocated as a result of studies by Drs. Charles Armstrong and W. T. Harrison of the National Institute of Health, U. S. Public Health Service.

Most of the studies reported were made with monkeys. However, a number of human volunteers were given nasal treatment with 4 per cent. sodium alum solution. They suffered no untoward symptoms other than slight local irritation and nasal discharge for a few hours, indicating that the treatment is safe.

It seems very effective in protecting monkeys against the disease. "Typical poliomyelitis (infantile paralysis) was induced in 26 of 34 untreated monkeys by the instillation on two occasions, 48 hours apart, of 1 cc. of a 10 per cent. suspension of poliomyelitic cords into each nostril," it was reported today. "The majority of monkeys treated with either sodium alum or tannic acid for a number of days prior to the instillation of virus were distinctly resistant to poliomyelitis. Only 2 of 20 monkeys treated in that manner with 4 per cent. sodium alum developed the disease, and these were in a group which apparently received more than the average amounts of virus. Most of the monkeys treated with 3 per cent. alum also proved resistant, while 0.5 per cent. and two per cent. had no effect Four per cent. tannic acid, although used in a smaller series, was also effective, while 0.4 per cent. and 0.8 per cent. were not.

"Treatment with alum for at least a few days prior to infection was necessary to induce resistance. The resistance could be maintained over a period of several weeks by one daily instillation of the chemical; omitting the treatment for 48 hours diminished the number of monkeys that were resistant."

The monkeys protected by the chemicals showed neither fever nor any other signs which could be attributed to infantile paralysis. When tested from one to two months later, they had no immunity to the disease, which seems to indicate that none of the virus entered their systems and also that the resistance brought on by the chemicals is not lasting.

The studies also showed that the most effective strengths for both chemicals is in four per cent. solutions.

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MEDICINE

Find Key Points of Body's Defense Against Polio

THREE key points in the body that play a part in resisting infection by infantile paralysis virus were identified by Drs. N. Paul Hudson, Edwin H. Lennette and Francis B. Gordon, of Ohio State University and the University of Chicago, in studies reported to the Society of American Bacteriologists.

The studies give much information on the important problem of resistance to this dreaded disease of children.

The three key points in the body's defense against the disease are: the membranes lining the nose and pharynx; the spleen; and the central nervous system, which means the brain and spinal cord. Most important, apparently, is the central nervous system, where the disease develops.

"Measures designed to protect against poliomyelitis (infantile paralysis) should take this into account," these investigators emphasized.

Although the infection naturally enters the body through the nose, the nose and pharynx offer some resistance to the infection, the studies showed. The spleen plays some part in the body's general resistance to the disease, its cells taking up the virus, though how they dispose of it is not clear.

The presence of "antibodies" in the blood serum is not a direct measure of the animal's resistance to infection from infantile paralysis virus given via the nose, Dr. Hudson and associates found. These antibodies were found far more often than resistance to the disease. This is important because finding these antibodies after doses of infantile paralysis vaccine has been considered evidence that the vaccinated child was protected against the disease.

In the studies reported today no evidence was found to show where in the body these antibodies are formed.

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RADIO

Tuesday, January 7, 4:30 p. m., E.S.T.

EXPLORING THE SEA — Commander Richard R. Lukens, U. S. Coast and Geodetic Survey.

January 14, 4:30 p. m., E.S.T.

MYSTERIES OF RADIO FADING—Dr. J. H. Dellinger, Chief of the Radio Division, National Bureau of Standards.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

NEW ENGLAND TALK BECOMES RARE SPECIMEN

In the Rhode Island kitchen, shown above, Herman G. Tucker, farmer-auctioneer, immortalizes his ideas for choosing a wife, while Robert L. Stone of Dr. Kurath's field staff records the sounds. Over a thousand similar records, the first systematic survey of New England speech ever made, will be used in making maps for a Linguistic Atlas of the United States and Canada, which a number of American universities are sponsoring.

MEDICINE

Warning Against Infantile Paralysis Vaccination Issued

A WARNING to physicians of the country to stop further vaccinations of children against infantile paralysis appears in The Journal of the American Medical Association (Dec. 28).

The warning may be read between the lines of a report of twelve cases of infantile paralysis, six of them fatal, following vaccination against the disease. The report is signed by Dr. J. P. Leake, Medical Director, U. S. Public Health Service, one of the country's authorities on this disease.

The twelve cases developed following the use of one or the other of two vaccines, named in the report only as vaccine A and vaccine B. Both vaccines were prepared from infantile paralysis virus treated so as to make it incapable of causing the disease, in the opinion of the scientists who made the vaccines. The cases of the disease following their use were reported to the U. S. Public Health Service by the scientists responsible for the vaccines, by several health officers, and by others.

Twelve cases of the disease following many thousand vaccinations does not seem at first glance a large percentage. The circumstances of the cases, however, and the amount of infantile paralysis among children of the same ages in the same communities, and the number of cases normally to be expected make the twelve cases much more significant, Dr. Leake points out in his report.

"Likelihood of the whole series of cases having occurred through natural causes is extremely small," he states.

He believes that many physicians will feel that these cases make "undesirable the further use of poliomyelitis (infantile paralysis) virus for human vaccination at present."

"Although any one of these cases may have been entirely unconnected with the vaccine, the implication of the series as a whole is clear," he states.

The cases also furnish new evidence in support of the theory that the virus of infantile paralysis travels along the nerves and not in the blood or lymph streams, as most disease "germs" do. In every one of these cases where the sequence is known, the level of the spinal cord first affected corresponded to the arm or leg where the vaccine was injected. The paralysis began either in the vaccinated limb or in the corresponding one on the other side of the body.

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LINGUISTICS

Yankees Lose Accent, And Boston its "Broad A"

NEW England is losing its famous brand of speech.

Even literary Boston, stronghold of the Broad A, is succumbing to the example of non-Bostonian accents heard over the radio, on the movie screen, and in other contacts.

Fading of New England's individual way of talking is detected by Dr. Hans Kurath of Brown University, who has completed the first systematic survey of New England speech ever attempted. The survey is for a Linguistic Atlas of the United States and Canada, which Dr. Kurath is directing.

It has taken four years to survey New England alone, Dr. Kurath reports. His staff visited 225 communities, talking with people, and making phonograph records and notations, all the way from the Green Mountains to Cape Cod and from Maine to Connecticut.

Way down east, along the seacoast, New England phrases and pronunciations are best holding their own, Dr. Kurath learned. A wheelbarrow is still a "weelbarrow" in a coast village. And forty is still "foty" with the vowel sounded like a in "all." But western New Englanders pronounce their "r"s and central New Englanders are taking to the western fashion.

The playwright or novelist who portrays New England farmers, fishermen, and school teachers will in future have to achieve realism, it appears, not by odd dialect and quaint sayings, but by making his characters talk prosaically like other people from the northern United States.

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To test the ability of glued arches to stand heavy snow loads, the Forest Products Laboratory has piled sandbags weighing 31,500 pounds on the roof of a new building containing three-hinged arches of glued wood construction.

MEDICINE

Encephalitis Virus Grown in Test Tube

THE virus of encephalitis, recently epidemic in St. Louis, has been grown in a test tube for the first time. The method by which this was achieved is reported by Drs. Jerome T. Syverton and George P. Berry of the University of Rochester School of Medicine and Dentistry. (*Science*, Dec. 20.)

Development of a means of growing this disease "germ" in a test tube or laboratory dish will mean that scientists investigating the virus no longer need to use animals to keep the strain alive for their experiments. The "food" on which the test tube virus was kept alive was made from embryonic mouse tissue, normal rabbit serum and a solution containing calcium, magnesium and similar chemicals.

Science News Letter, January 4, 1936

PLANT PHYSIOLOGY

Cancer-Causing Chemicals Induce Tumors in Plants

CHEMICALS that produce cancer in man and animals also cause abnormal tissue growths when applied to plants, Dr. Michael Levine of Montefiore Hospital, New York City, told the meeting of the American Botanical Society.

Dr. Levine used a number of substances, including the well-known cancer-provoking coal tar and compounds containing the "sulfhydril" group, claimed by some physiologists to be especially liable to cause abnormal cell formation. He applied them to the growing tips of a considerable variety of plants, both annuals and perennials.

Young sunflower plants thus treated grew crooked stems, the spaces between the leaves were shortened, many small branches were formed producing a "witch's broom" effect. Injured or injected stems painted with chemicals or treated with powdered forms of these agents produced swellings with small tumor-like growths.

Under the microscope, these abnormal growths displayed certain cancer-like appearances, but of the simplest type. The plant tissues did not remain permanently cancerous, but developed the characteristics of mature tissue and stopped their wild undirected growth.

Annual plants seemed most responsive to the cancer-provoking agents. Perennials reacted far less and recovered sooner. Compounds containing the "sulfhydril" chemical group did not appear to be more effective than the other chemicals in producing the overgrowths.

Science News Letter, January 4, 1936

ENGINEERING

Olive Oil May Be Used in Automobiles in Tropics

OLIVE oil is a suitable lubricant for automobile engines, according to Prof. M. Bastet of the Agricultural Institute of Algeria. (*La Nature*, Nov. 15.)

After being pressed from the fruit, the oil must be de-acidified so that it will not corrode the metal parts of the motor. It may then be used in the crank case or may be graphited for use as a gear lubricant. Using a mixture of one part of olive oil to three parts of the usual mineral oil seems to give better results than the use of either oil by itself. This discovery may solve a difficult problem in tropical and semi-tropical countries where olives are abundant but where mineral oil products are scarce and costly.

Science News Letter, January 4, 1936

PHYSICS

Scientist Calculates Mass of the Universe

TAKE the figure 2 and add 55 ciphers after it and you will have the mass of the universe expressed in grams!

That, in effect, is the report of the famous Viennese physicist, Prof. Arthur Haas, before the meeting of the American Physical Society. Prof Haas is this year visiting professor of physics at Bowdoin College.

Prof. Haas did not weigh the universe to find its mass, as might seem necessary to the layman. His result was based on theoretical calculations whose interest to scientists is the fact that they were made without the use of customary helps like relativity theory, the concept of an expanding universe, the curvature of space or astronomical data.

From the same calculations Prof. Haas derived the number of particles in the universe and the radius of a spherical volume of space over which astronomical objects are distributed.

The number of particles amounts to the figure 12 with 78 ciphers after it. And the radius in centimeters of the volume of space is expressed as 93 with 25 ciphers following.

Science News Letter, January 4, 1936

IN SCIEN

MEDICINE

Trench Mouth Increase Traced To Dirty Glasses

AN INCREASE in trench mouth and possibly other serious diseases was laid at the doors of taverns and eating establishments serving alcoholic beverages by Dr. Don Chalmers Lyons of Jackson, Mich.

The increase in these diseases has probably occurred because beverage dispensing establishments are not using proper methods of cleaning their glasses, Dr. Lyons charged in a report to the Society of American Bacteriologists.

He found large percentages of the trench mouth organism and other disease "germs" on the rims of glasses racked on the bar and ready for use and also on glasses rinsed after their return from the customers.

The findings of this study and of a similar one by Drs. W. L. Mallman and W. L. Chandler of the Michigan State College suggest, said Dr. Lyons, "the necessity of better control of methods of glassware cleansing in such establishments."

Science News Letter, January 4, 1936

ASTRONOMY

23-Year Solar Cycle Dates To Ancient Geologic Times

THE 23-YEAR period of solar activity, which is the dominant one of twelve solar cycles, not only exists at present but has existed in at least two past geologic ages, Dr. Charles G. Abbot, secretary of the Smithsonian Institution, told the American Association for the Advancement of Science.

Evidence has been uncovered by paleontologists and geologists that the same slow tides in the sun's energy flowed and ebbed in pleistocene and eocene times that are moving today, he said. Pleistocene time was the Great Ice Age; eocene time was the dawn of the Age of Mammals, about 55,000,000 years ago.

All the twelve lesser solar cycles are aliquot parts of the 23-year period.

Science News Letter, January 4, 1936

...NE FIELDS

ZOOLOGY

Lowest Animals "All Eyes"; "See" Light By Entire Body

THE lowest animals lack eyes, but are "all eyes" in that they can perceive light with their entire body surfaces. The ameba, a primitive one-celled creature, is an example of this kind of elementary "seeing," Dr. Walter N. Hess of Hamilton College told the Zoological Society of America.

Up the scale just a trifle, but still among the one-celled animals, are other forms in which only the back of the body, usually turned uppermost, is sensitive to light. A little more specialized are one-celled animals which have their light-sensitiveness concentrated at one spot on the body.

Once the step to many-celled structure has been made, specialization sets in. Even such lowly creatures as worms have cells set aside for the special job of responding to light; here we are at the beginnings of eyes. But these cells are still widely scattered over the body, not grouped into well-developed seeing organs such as we find in the higher animals. In other members of the lower groups the light-sensitive function is more definitely localized, the location of these incipient "eyes" being usually toward the forward end of the body.

Science News Letter, January 4, 1936

MEDICINE

Vitamin C May Be Remedy In Infantile Paralysis

SCURVY-PREVENTING vitamin C may prove to be a remedy for infantile paralysis, it appears from studies reported by Dr. Claus W. Jungeblut of College of Physicians and Surgeons, Columbia University, to the Society of American Bacteriologists.

Dr. Jungeblut's results were obtained with monkeys and not in human cases of the disease. He cautions against drawing definite conclusions from his preliminary report but states that "there seems to be a strong probability that vitamin C when injected in proper doses possesses distinct therapeutic power in experimental poliomyelitis."

Vitamin C is found in many fresh fruits and vegetables and has also been prepared synthetically. Dr. Jungeblut injected this vitamin under the skin of monkeys on the day they were infected with infantile paralysis and every day thereafter for two and one-half weeks. One group of monkeys, untreated, served as controls. All these control animals developed typical infantile paralysis. Some of the animals treated with the vitamin did not develop the disease, others developed it without paralysis, and still others developed the disease in typical paralytic form. Apparently the amount of vitamin C given was important, large doses being less effective than small ones.

The monkey studies followed a previous discovery that when very small amounts of vitamin C are added to infantile paralysis virus in the test tube, the virus loses its disease-producing power. These small amounts of the vitamin are normally present in the central nervous system of man, Dr. Jungeblut pointed out. He believes that the presence of these small amounts of the vitamin may account for the fact that the great majority of humans are not susceptible to the disease. Those who are susceptible to it are not necessarily persons who do not get enough of the vitamin in their diet. Glandular disturbance may prevent proper use of the vitamin by such persons, he suggests.

Science News Letter, January 4, 1936

ENTOMOLOGY

Chinch Bugs Carry Own Death Germs

CHINCH bugs, second only to the drought in crop destruction during the trying summer of 1934, carry the germs of their own destruction within their bodies. So Dr. L. R. Tehon of the Illinois State Natural History Survey told the Mycological Society of America.

Chinch bugs readily fall victims to a mold-like fungus known as *Beauveria globulifera*, when weather conditions are favorable for its growth. Collections of the bugs made in Indiana and Illinois between February and May of last year were practically uniformly infected. Since Dr. Tehon carefully sterilized the outside of the bugs' bodies before he examined them, and still found the living fungus, he concludes that they carry this organism, deadly to them, in their interior.

Dr. Tehon found that the bugs harbor a number of other fungus species.

Science News Letter, January 4, 1936

RADIO

Shortwave Interference Traced to Fever Machines

THE cause of the mysterious shortwave radio "shadow" interference, which has greatly disturbed authorities in recent months, was definitely located by scientists in the Cruft Laboratory of Harvard University, under the direction of Prof. H. R. Mimno.

Medical devices for inducing artificial fevers were proved to be responsible for the radio interference. Tests conducted today from Cambridge with one of these machines in normal use proved that signals transmitted from one of the fever machines could be heard by the Naval Research Laboratory in Washington, D. C.

Previously it had been believed that machines of this type could interfere with radio reception over an area extending only a few miles from the source. Today's tests were the first to prove that a signal from an individual machine could be heard and identified hundreds or even thousands of miles, with sufficient signal strength to interfere seriously with shortwave radio.

The signal from one of these fever machines has the characteristic of any shortwave radio and gives a strong whirring sound, which prevents the hearing of any messages going out on the same wavelength. The power lines feeding the apparatus act as antenna in sending out interfering signals.

Reports indicate that interfering signals from these machines have been heard all over the United States, Canada, Central America, and even Europe.

Observers at the Cruft Laboratory looking for the source of the shortwave interference at the request of the Federal Communications Commission for the past ten days, have heard as many as twelve of these machines in operation at once, apparently in widely separated parts of the country.

Naval authorities have been seriously worried, because the hitherto unidentified signals have interfered with all types of shortwave communication, including airplane radio, official government communication, foreign broadcast, and ship-to-shore radio.

The investigators at the Cruft Laboratory point out that the interference difficulty can be easily overcome by minor changes in the design of the machines. Associated with Prof. Mimno in this research have been H. Selvidge, J. A. Pierce, and P. B. King, Jr.

Science News Letter, January 4, 1936

PUBLIC HEALTH

Good Health for 1936

This is a Prediction as Well as a Toast; No Serious Epidemics Expected; Better Economic Condition Helps

By DR. LOUIS I. DUBLIN, **Past President, American Public Health Association, Third Vice-President and Statistician, Metropolitan Life Insurance Co.**

LAST December I predicted for Science Service that 1935 would enjoy good health conditions. My optimism was fully justified. In the first place, the death rate for eleven months of this year, among a large cross-section of the population—that is, approximately 17 million Industrial policyholders of the Metropolitan Life Insurance Company—was 2.5 per cent. below that which obtained for the same period in 1934; and 1934 was the record health year of all time in this insured group. Furthermore, figures published by the United States Bureau of the Census showed that in 86 large cities the death rate, up to the week ending November 16, was identical with that for the same period of 1934. These are excellent indications that 1935 made one of the best, if not the very best, records for mortality ever registered.

Early in 1935 there was, to be sure, an appreciable increase in sickness from influenza and pneumonia, but no serious epidemic developed, and it now appears that the influenza death rate for the year will be actually below the average for a number of recent years.

Increase of Measles

In the spring there was a marked increase in sickness from measles and scarlet fever, but the death rates from these diseases remained low. In May, an epidemic of poliomyelitis started in North Carolina. It spread northward to all the states bordering the Atlantic Ocean. Nevertheless, the case fatality rate remained unusually low, and the disease caused relatively few deaths. In New York City, for example, there were only 4.2 deaths per 100 cases for 50 weeks of the year. The closest approach to this figure in the past for poliomyelitis was 9.4 deaths per 100 cases in 1923.

For the first time in several years there has been a sharp increase in the incidence of smallpox. In fact, there were about one-half again as many cases reported for the first eleven months of 1935 as during the same period of 1934; and there were one-fifth more cases than in 1933. The increase was confined principally to certain of the Midwestern, Northwestern and Pacific Coast States. It is fortunate that the disease was, by and large, of a mild type, and that there were few deaths. The important thing is that so large an increase in cases of smallpox signifies that the disease is still far from completely controlled in this country. Certain States are still not alive to the menace of smallpox. There we find much organized opposition to vaccination. If this could be overcome in parts of the West and Middlewest, as it has been in New England and the Middle Atlantic States, there would be no smallpox problem in the United States.

Will Probably Continue

During 1936 I expect the continuance of good health conditions as they have prevailed in 1935. It is, however, necessary to safeguard the prediction with one or two reservations. First, we always have to reckon with weather conditions and these cannot be predicted. Again, there is always the possibility of epidemics such as the great pandemic of influenza which swept the whole world during the latter part of 1918 and the early months of 1919, with a severe recrudescence in 1920. Nothing approaching the mortality of those years from influenza and pneumonia has been observed before or since, although there have been minor outbreaks for which a certain degree of periodicity has been observed. The point is that a widespread epidemic of influenza, or of some other disease, would cause many deaths, and one must make allowance for the possibility of its occurrence—remote as that possibility may be.

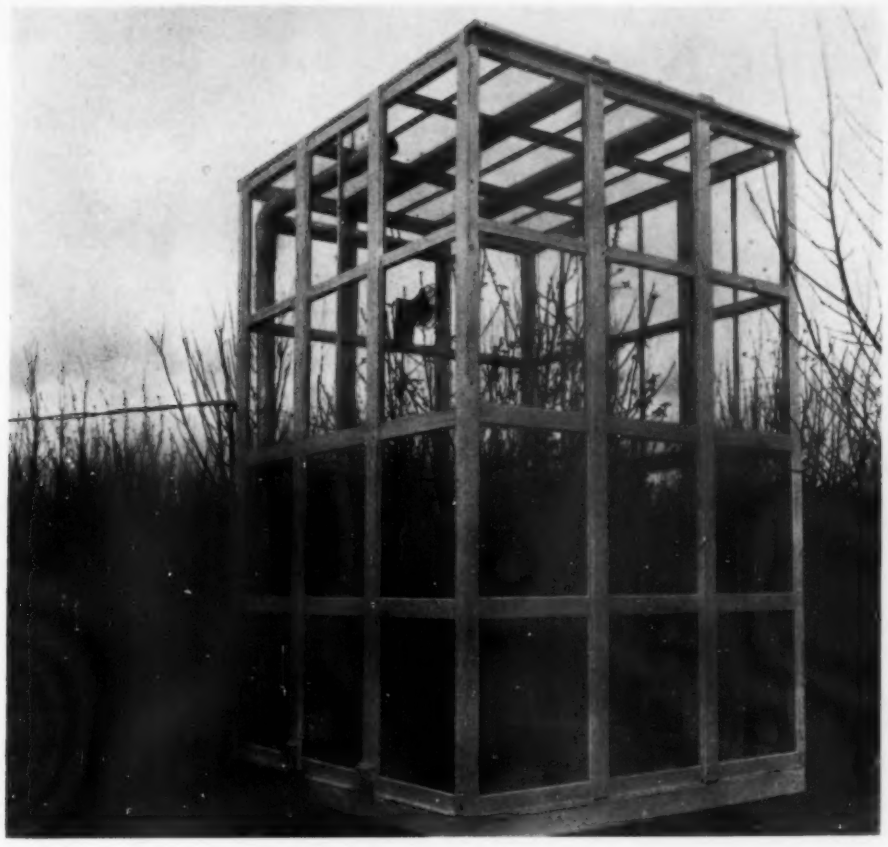
Aside from this possibility, public health workers regard the danger of wide-spread epidemics of other diseases as almost negligible. All of the old menaces like typhoid, smallpox, measles, scarlet fever, whooping cough and diphtheria have become minor causes of death. The chance is very remote indeed that any of them will ever again assume sufficient importance in the mortality tables seriously to affect the general death rate.

I believe that the tuberculosis death rate will continue its downward course in 1936. I am looking forward, indeed, beyond that year—i.e., to 1940. By that time the tuberculosis death rate in the general population of the United States should drop to 40 per 100,000 population—or even below 40. Fifteen years ago it was 114 per 100,000; by 1934 it had dropped to 56.6, less than one half the 1920 figure. If the same rate of improvement prevailed in the general population during 1935 as has been observed among the millions of Industrial policyholders of the Metropolitan Life Insurance Company, the tuberculosis death rate for the country should be about 52 per 100,000 in 1935. It is easily seen that if anything like the same rate of decline is maintained up to 1940, the tuberculosis mortality rate for that year will fall well below 40 per 100,000.

There is no guarantee, of course, in these predictions. The hardest job in the war against any disease is to maintain the same rate of improvement after the mortality has been reduced to a mere fraction of what it once was. Certainly there is no excuse for a let-down in our efforts to conquer tuberculosis. Despite the gains we have made, it is still the most important cause of death in early adult life. In several states, however, the death rate for this disease has been reduced to very low figures. The lowest in 1934 was that for Iowa (24.9), and 6 other States reduced their rate to 30 per 100,000 or less. What these States have accomplished can be done anywhere if the effort is expended.

Fewer Accidents

As for certain other diseases which play an important part in the mortality picture, the 1935 record has been exceedingly encouraging among Metropolitan policyholders and this probably has applied to the country as a whole. We have observed in this insured group some improvement in the mortality from heart disease, cancer, cerebral hemorrhage, and, more particularly, from chronic nephritis. In addition there have been fewer fatal accidents. These five causes of death, taken together, account for more than one half of the mortality from all causes combined. The automo-



IN A GLASS HOUSE

This apple tree in the orchards at Cornell University has been entirely enclosed for a study of its life processes. The little house at the left is the control unit which draws off carbon dioxide from the experiment chamber and measures the photosynthesis.

bile death rate is 4.8 per cent. lower than 1934. We are earnestly hoping that these improvements will continue in 1936. If these gains do extend into that year, a splendid health record is assured.

The country is surely coming out of the depression. Millions of people are improving their economic condition and this should materially help in the drive for better health and a still lower death rate. Communities will now be better able to support their official and voluntary health agencies—services which have proved their worth during these trying years. Now that the country is returning to normal, it should be more easily possible to restore the various health facilities which the enforced economy of the earlier years curtailed. It was never truer than now that public health is purchasable and that expenditures made to support approved health agencies are a good investment, bringing large returns to communities that take the health obligations of their people seriously.

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PHYSIOLOGY

Ear's Pattern of Nerve Cells Like Player Piano Record

"LIKE the paper record for a player piano."

That was the graphic description of the mathematically precise arrangement of nerve cells in the little known basilar membrane of the inner ear given by Dr. Dorothy Wolff, of Washington University Medical School, speaking before the American Association for the Advancement of Science.

This tiny ear membrane, a most important part of the hearing apparatus, is like a wire bent to form a rather angular C but also coiled spirally so that it is in three planes, Dr. Wolff said. The wire is not smooth, but is strung with "beads" which are nerve cells. These beads are grouped in clusters as are grapes on a stem, the "bunches" growing largest at the lower part of the middle turn of the spiral and at the top.

In the ears of lower mammals, the nerve cells are more closely packed into the canal that holds them than they are in man or monkey. In rats they are so close that they are forced into a hexagonal shape. In man, they are round or oval.

Nerve fibers are not like straight wires running direct from one point to another, according to Dr. Wolff's description. Instead, they interlace in the most complicated fashion.

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PLANT PHYSIOLOGY

Whole Apple Tree Caged In Glass House For Study

AN APPLE tree that lived in a glass house for a whole growing season, for the sake of science, was described at the meeting of the Botanical Society of America by Dr. Arthur J. Heinicke of Cornell University.

The tree was a normal eight-year-old McIntosh apple tree in the Cornell University orchard at Ithaca, N. Y. It was entirely enclosed in a large glass chamber from May 15 to Nov. 1, 1935. All ingoing and outcoming air handled by the ventilating system was sampled and analyzed, to see what the tree was doing with it. The objective of the large-scale experiment was to study how fast the tree made and used plant food materials.

From the time the leaves first opened until the blossoms had spent their days in the sun and shed their petals, the tree was living on its accumulated assets of food, stored from previous seasons. In the plant physiologist's terms, its respiration exceeded its photosynthesis. From that time on, however, there was a gradual increase in apparent photosynthesis; that is, the tree was making and storing food faster than it was using it up in its own life processes. After the first heavy frost, and especially when many of the leaves began to drop in late October, the tree was unable to manufacture food rapidly, and the season's decline set in.

There were wide variations in the tree's food-making rate from day to day, and at different hours within a given day, determined largely by the duration and intensity of the sunlight and by the percentage of carbon dioxide present in the air. Carbon dioxide, though existing as only a fraction of a per cent., is the basic raw material which all green plants take in from the atmosphere to combine with water in the formation of primary food substances.

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Vitamin A is not effective in preventing colds, medical authorities report.

PSYCHIATRY

Brandy "Shot" Brings Mental Patients Out of Stupor

ALCOHOL can bring men out of a stupor as well as drive them into one. Brandy can do the trick if given in real "shots"—by hypodermic injection.

Men lying in the death-like stupor of the mental disease schizophrenia have broken a silence of months as a result of getting mildly intoxicated on brandy, it is revealed by Drs. N. V. Kantorovich and S. K. Constantinovich, of the Medical Institute and Psychiatric Hospital, Leningrad, in making a preliminary report of their experiments to the American Psychiatric Association.

The brandy was given by hypodermic because patients in this condition could not be made to swallow the liquid. The results promise a new method of treatment for these inaccessible sufferers walled in by a barrier of silence.

"M," a young musician only 21 years old, had been ill for a month. He could not answer a single question put to him by the physicians or hospital attendants. He just grimaced, shrieked, or muttered unintelligibly.

A few minutes after receiving the brandy, this patient quieted down and answered the physician's questions readily. Later he was able to write a coherent letter to his mother. In a couple of weeks he appeared to be entirely recovered.

Another young man had not spoken a word for over six months and had been ill for two years. He lay rigid with a mask-like expression on his face.

A few minutes after he received the brandy, he smiled and asked for a cigarette. Five minutes later he began to talk, and told the physicians the whole story of what lay behind his illness. He said that he had lain silent for months because he was afraid that if he attracted any attention his enemies would kill him.

After his "jag" wore off, he returned to his mute condition, but he has been noticeably improved, even able to do some work in the shop.

The physicians tried this method on 15 patients. Four were markedly improved. In seven other cases, the improvement seemed to last only while they were under the influence of the alcohol, but was considered worthwhile since it gave physicians some contact with them and clues about their mental state. In four cases, the alcohol seemed to produce no considerable change.

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PSYCHOLOGY

Scientific Study of Human Wants and Values Is Urged

HUNGER and thirst and the need for protection against cold and storm may be primary needs in man, but they are only of minor importance in the American's budget, scientists gathered at the meeting of the American Association for the Advancement of Science learned from the address of their retiring president, Dr. Edward L. Thorndike, psychologist of Teachers College, Columbia University.

In a good year, Americans spend 17 billions of dollars on food, but only a little more than half that amount to satisfy hunger. Another 8 billions goes for clothing, but only 41 per cent. of that for actual protection against cold, heat and wet.

Of the 700 millions spent on cosmetics and beauty parlors, one-seventh is for the pleasures of sight and smell, one-fourth for the pleasures of sex and courtship, one-third to gain general approval from others, one-eighth to have inner self-approval, and about one-tenth to secure mastery or domination. Dr. Thorndike urged his fellow scientists to include in their research an appraisal of human wants and satisfactions.

Determining what is of value to civilization should not be left to the philosopher, the sage, or the moralist; such determinations are amenable to scientific methods, Dr. Thorndike said.

All men should not be considered equal when these values are determined scientifically, he indicated. The wants of the men of 1950 should be given more importance than the same wants in the men of 2050.

The wants of intelligent men should be given more weight than the same wants of dull men; the wants of good men more than those of bad men.

An analysis by psychologists of the spending of Americans was quoted by Dr. Thorndike as revealing the real wants of human beings today.

Budget of Wants

"When the entire annual budget is transformed item by item into a budget for the satisfaction of human wants, payments for sensory pleasures, security, approval of others, and the pleasures of companionship and sociability, including romance and courtship, are in each case close in magnitude to the amount paid for freedom from hunger," he said. "In fact, we pay more to maintain self-respect and the good opinion of others and avoid scorn, derision and shame than to keep our bodies fed and free from the distress of hunger.

"We pay more for entertainment, including the intellectual pleasures and the sensory pleasures of sight, sound, taste and smell, than for protection against cold, heat, wet, animals, disease, criminals and other bad people, and pain.

"Less than one-third of what we spent went for wants which must be satisfied to keep the human species alive and self-perpetuating. The rest went chiefly to keep us amused and comfortable physically, intellectually, normally, and especially socially.

"Relatively little is paid for the satisfactions of the intellectual life. The psychologists consider that the payments for private schools, books, and magazines are often for prestige, power and other practical satisfaction, and do not credit the theatres and movies of 1929 with much intellectual appeal."

Can Improve Desires

Man can be made to improve his desires, Dr. Thorndike holds.

"The desires and aversions of men can be changed as truly as their ideas and habits, though not as much or as easily. The same forces of repetition

and reward that strengthen tendencies to think and do, operate upon tendencies to like and dislike.

"If sound methods are used, men can be taught to find satisfaction in useful work, healthful and noble recreation, and the welfare of others, to a degree that the world has never seen."

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PHYSIOLOGY

Tests of Nervous System Made in Cellar Laboratory

Changing Thickness of Finger, Index of Expanding Blood Vessels, Gives Clue to Sympathetic System

NEW light on the working of the sympathetic, or involuntary, nervous system is being shed by research carried on at the National Hospital for Nervous Diseases in London.

Until some of the results of the research are published in scientific journals, in the near future, the neurologists conducting it wish to preserve strict anonymity. The reason that public attention has been focussed on the Hospital and its researches is that the Rockefeller Foundation has offered provisional grants totalling $600,000 toward new laboratories and the endowment of their work.

The research on the sympathetic nervous system is being carried on in a subterranean cellar which at one time belonged to a convent. Outside is a red-lettered notice reading "It is dangerous to open this door," for elaborate experiments are being made on human beings, and the sudden opening of the door might startle the subject and lead to his being hurt.

It is the sympathetic nervous system which is responsible for the beating of the heart, for the movements of the digestive organs and for all other bodily processes that are performed without conscious effort. It is also concerned with the various links between the emotions and physical reactions, such as that between fear and the bristling of hair which in human beings is chiefly noticeable in the effect called "gooseskin." Little is as yet known as to the details of how and why the activity of this involuntary nervous system varies among normal human beings—that is, for instance, why one of two brothers may be much more "highly strung" than another.

It is toward the solution of these and many other allied problems that this research is directed. The essence of the method lies in the measuring of reactions of the sympathetic nerves through recording changes in the blood-vessels, whose size is governed by the sympathetic system.

In practice, the thickness of a finger, which alters with the expansion and contraction of its multitude of minute blood-vessels, serves as the criterion. The changes of volume are naturally extremely small, but they are magnified by the apparatus—a pneumatic system being connected at one end to a sealed rubber finger-stall and at the other to an arrangement of mirrors—and are finally recorded photographically, along with a time-scale, on a moving roll of bromide paper.

An important feature of these experiments is that the subject is made to keep his feet in warm water. This neutralizes the ordinary effect of slight changes in room temperature. Normally these changes cause frequent slight variations in the sympathetic and vascular systems, and such variations would affect the accuracy of measurements of other sympathetic reactions.

Experiments have been made with subjects some of whose sympathetic nerves have been severed by accident or disease, or whose brains have been injured, as by the removal of brain tumors. Work on the latter type of case has shown almost certainly that the sympathetic nervous system can function normally even though the cortex is badly injured.

This important result, which suggests that the human sympathetic nervous system is centered in the diencephalon (at the base of the brain, near the pituitary or "master-gland"), will shortly be published in a scientific journal. It confirms the result recently reported by Dr. S. W. Ranson, of Northwestern University, Evanston, as the result of experimental work on animals.

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WHERE NERVES ARE TESTED

Apparatus for testing nerve reactions in the cellar laboratory of the National Hospital for Nervous Diseases, London. The foot bath is to neutralize the effect of slight changes of room temperature. A pneumatic system is connected to the man's finger to record the expansion and contraction of minute blood vessels.

GENERAL SCIENCE

Grants For the Support of Science Cut 77 Per Cent.

FINANCIAL support of science by the large foundations has been cut to less than one-fourth of what was spent for this purpose during 1930, it is revealed by a survey of the Twentieth Century Fund recently made public.

Funds for research in the physical and biological sciences dropped $6,000,000. Appropriations from the 68 foundations surveyed amounted to $7,774,999 in 1930. In 1934 the figure had dropped to only $1,746,662.

Funds for medicine and public health were cut from $28,841,937, granted in 1930, to but $8,609,710 for 1934, a loss of 70 per cent.

The reduction in grants for scientific and health work do not represent any loss of capital by the foundations during the depression, the Twentieth Century Fund found. In fact, their security holdings are reported to have actually increased seven-tenths of one per cent. The foundations have suffered a loss of income on their holdings, of course, but the grants were reduced before the capital was endangered.

Donations in certain fields have been increased somewhat, it was found. Economics received a 74 per cent. increase, from $587,582 to $1,021,532; city planning and housing, 82 per cent., from $150,784 to $275,206. Labor received an increase of 141 per cent., but this large percentage increase represents actually a comparatively small increase in dollars—from $9,570 to $23,091.

On the average, grants for all purposes were cut 53 per cent.—from $68,225,411 to $32,063,619. This means a drop in funds for education and research in various fields of more than $36,000,000.

Science News Letter, January 4, 1936

VITALISM
and
MECHANISM
A DISCUSSION
between
HERBERT V. NEAL
Professor of Zoology, Tufts College
and
JAMES F. PORTER
Is life a blind automatic machine or is it planned and directed to produce pure souls?
25 Cents
SHERMAN M. GOBLE
166 W. Jackson St. Chicago, Ill.

SAFETY

About Ten Seconds Needed To Pass the Car Ahead

IF YOU want to pass the car ahead of you, be sure you have from 1,000 to 1,600 feet of clear roadway ahead and allow at least 10 or 11 seconds to get back on your own side of the road.

This is the practical rule for motorists pronounced by Prof. B. D. Greenshields, of Denison University, at the meeting of the Highway Research Board. Prof. Greenshields has made a photographic record of 7,500 cars on the road.

Many drivers pass with less than the safe distance available, he found. They seem to depend upon the driver coming from the other direction to slow up or give way for them to avoid an accident.

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RADIO

Radio Waves Acts As Tamper-Proof Burglar Alarm

A TAMPER-PROOF burglar alarm that sets up a field of radio waves, from which an intruder cannot escape without detection, has been designed by Thomas S. McCaleb of the Institute of Geographical Exploration at Harvard University. Further development of the device, Mr. McCaleb says, may lead to its use as an ultra-sensitive airplane detector.

So delicate is the instrument that once an intruder has entered a protected room it is absolutely impossible for him to avoid detection, even if he should know of the alarm and attempt concealment. In this feature the new alarm is a decided improvement over types of alarms operated by photoelectric eyes, which intruders can in some cases avoid.

Essentially, the apparatus consists of an ultra-short wave transmitter and receiver placed on opposite sides of the room to be protected. High frequency signals of seven-tenths meter wavelength are broadcast from the transmitter and are reflected back and forth by the sides of the room, literally filling it with waves. These waves are really responsible for trapping the intruder, for the disturbance of only a few of the many million in the room gives the alarm.

Under ordinary conditions the intensity of the signals as they reach the receiver is constant, but a foreign body in the field acts as a mirror and reflects the radio waves in such a manner as to change the intensity reading. This change in intensity, often extremely minute, is used to trip the alarm.

Use of larger transmitters in a line, with the signals directed up into the atmosphere to form a sheet of waves, experiments by various government scientists show, would enable the detection of any aircraft passing through them. The plane, like the intruder, would reflect the waves back to earth to receivers. Using the positions of the sending and receiving stations, it might also be possible to determine the exact position of the plane.

The instrument was originally designed to be used in the lecture hall for spectacular demonstrations of the effect of certain types of antennas, reflectors, and obstructions in short wave broadcasting.

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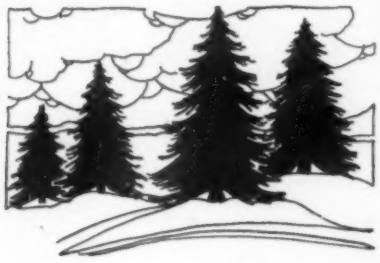
NATURE RAMBLINGS
by Frank Thone



Guardians of the Snow

CONIFER trees and snow always seem to belong together.

So strong is this traditional connection, that Southerners, setting up for Christmas trees little native pines or junipers that have never known snow, will surround them with sheets of cotton batting and decorate them with glittering bits of silver tinsel, and perhaps explain carefully to their children just what snow is. Conifers are by no means confined to the lands of snowy winters, but so ineradicable is the picture of snow-surrounded evergreens that when Rudyard Kipling wanted to pack the geographical grandiosity of the British Empire into a single phrase, he wrote of "dominion over palm and pine."

Although it is true that the coniferous trees can be found in lands that reach toward the sun (in our own South, they dispute dominion with at least one kind of palm!), nevertheless they do belong first to the North. Or perhaps it would be more proper to say that the North belongs to them. They circle the boreal end of the earth like a dark-green garland. They are the last trees that look upon the desolate tundras, that run to the Arctic sea. Willows and poplars and birches push toward the North, too; but they surrender and dwindle to bushes, while the spruces still stand up as trees.

Incidentally, Kipling limited the northern extent of his Empire unnecessarily (though probably quite unconsciously) when he made the pine the symbol of the North. Spruces run far to the north, beyond the last of the pines, just as the pines leave the spruces behind in their southerly extension. Their ranges overlap, but it is the spruce that in general stays within the circle of deep annual snow.

There is good reason for that, for the snow is more necessary to the spruce than it is to the pine. Some of the evergreens—and pine and juniper are outstanding among them—can stand a good deal of drought. Not all kinds of pine; but there are enough dryland pines to make good forests in lands where the slow seep of melting snow never figures as a source of ground water.

Not so the spruces, however, nor yet their cousins the firs. They are rather more particular than most pines, and seek the moister regions. Where they grow in competition with pines, the spruces and firs cling to the shady, damp sides of ravines. Lands that they dominate are usually found to be perennially moist. In part, these conifers attend to that themselves, for their dense foliage makes a superior shade for the snow that lies under their canopy, holding it against the ardor of the spring sun and permitting it to melt only slowly—and to the advantage of their roots.

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RADIO

How the Milky Way Sends Radio Signals To Earth

AN EXPLANATION of the cause of the mysterious radio signals coming from the region of space marked by the Milky Way was presented to the meeting of the American Physical Society by Dr. Robert Langer, California Institute of Technology.

The mystery radio signals, reported by Dr. Karl G. Jansky of the Bell Telephone Laboratories two years ago, puzzled their discoverer and other scientists alike.

Dr. Langer's suggestion is that the interstellar dust in space becomes charged electrically by the ultraviolet light from the stars. Each dust particle then becomes, in effect, a tiny radio transmitting set, and when disturbed in any way will send out a wave.

The surprising thing is that the dust particle, to send out a wave like those received by Dr. Jansky's apparatus, must be only a ten-thousandth of an inch across.

This is just the size of the particle which is known to exist in interstellar space. Morever, the amount and character of the radio energy received in the Bell Telephone research is just about what would be expected from known interstellar conditions.

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Education

SOCIAL STUDIES—Ed. by William McAndrew—*Little, Brown & Co.*, 465 p., $1.60. An orientation handbook for high school students, including such topics as the art of thinking, mastering time, leisure, politics, and American ideals discussed by writers from many fields—among others, William McAndrew, Louise Stanley, Charles P. Taft, 2nd, and Mrs. Franklin D. Roosevelt.

Science News Letter, January 4, 1936

General Science

CARNEGIE INSTITUTION OF WASHINGTON, YEAR BOOK NO. 34, JULY 1, 1935-JUNE 30, 1935—*Carnegie Institution*, 401 p., $1 paper, $1.50 cloth.

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Statistics

STATISTICAL PROCEDURES AND THEIR MATHEMATICAL BASES — Charles C. Peters and Walter R. VanVoorhis—363 p., $1.50.

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Child Study

WAYWARD YOUTH — August Aichhorn—*Viking Press*, 236 p., $2.75. Case histories from a child guidance clinic in Vienna illustrate this discussion of the application of psychoanalysis to a practical and important problem. The work is introduced by a foreword over the signature of Sigmund Freud.

Science News Letter, January 4, 1936

Psychology

THE FOUNDATIONS OF HUMAN NATURE—John Morris Dorsey—*Longmans, Green*, 488 p., $2.80. A somewhat philosophical discussion of mental health and disease.

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Mental Hygiene

PERSONALITY MALADJUSTMENTS AND MENTAL HYGIENE—J. E. Wallace Wallin—*McGraw Hill Book Co.*, 511 p., $3. A textbook for psychologists, educators, counselors, and mental hygiene workers by the director of the Division of Special Education and Mental Hygiene for the Delaware State Department of Public Instruction.

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Religion and Science

RELIGION AND THE SCIENCES OF LIFE — William McDougall — *Duke Univ. Press* 263 p., $3. A collection of some of the author's writings over a period of years formerly available only in scattered publications, with a few that have never before appeared in their present form.

Science News Letter, January 4, 1936

Photography

TELEPHOTOGRAPHY; New and enlarged ed.—Cyril F. Lan-Davis — *Pitman Pub. Corp.*, 117 p., $1.25. This fourth edition of a comprehensive explanation of telephotographic lenses and their use is by H. A. Carter and of British origin.

Science News Letter, January 4, 1936

Biology

NATURE NOTES FOR WESTERN PENNSYLVANIANS, No. 1—Edited by R. T. Hance—*Biology Teacher's Club, Western Pennsylvania Educational Association*, Free to members of the Club, and to libraries. A small mimeographed magazine, dedicated to the activities of one group of nature teachers. It might well furnish hints to other similar groups who may be considering the problem of local publication at low cost.

Science News Letter, January 4, 1936

Psychology

BEHAVIOR, KNOWLEDGE, FACT—Arthur F. Bentley—*Principia Press*, 391 p., $3.50. A philosophical discussion including an appraisal of psychology as a form of knowledge.

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Psychology

AN INTRODUCTION TO EXPERIMENTAL PSYCHOLOGY—Paul F. Finner—*Prentice-Hall*, 268 p., $2. An elementary textbook, including material for experiments in appendixes, conveniently perforated for removal.

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Psychology

PROPAGANDA, ITS PSYCHOLOGY AND TECHNIQUE—Leonard W. Doob—*Henry Holt & Co.*, 424 p., $3. Propaganda is an almost universal weapon, not only for war, but for commerce and social control. Whether you are interested in "dishing it out" or withstanding its assault, you will find food for thought in this volume.

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Engineering

AIR CONDITIONING SIMPLIFIED—Harold L. Alt—*Domestic Engineering Co.*, 215 p., $1.

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Chemistry

LABORATORY AND WORKBOOK UNITS IN CHEMISTRY—Maurice U. Ames, and Bernard Jaffe—*Silver, Burdette and Co.*, 240 p., $1.08.

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Chemistry

LABORATORY AND WORKBOOK UNITS IN CHEMISTRY—Maurice U. Ames, and Bernard Jaffe—*Silver, Burdette and Co.*, 228 p., 84c.

Science News Letter, January 4, 1936

Electricity

RURAL ELECTRIFICATION — J. P. Schaenzer — *Bruce Pub. Co.*, 266 p., $1.72.

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Psychology

STUDY OUTLINE FOR GENERAL PSYCHOLOGY — S. L. Crawley — *Prentice-Hall*, 223 p., $1.50.

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Psychology

PSYCHOLOGICAL FOUNDATIONS OF EDUCATION—J. Stanley Gray—*American Book Co.*, 534 p., $2.35. A textbook for students of education who have already had a beginning course in general psychology.

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Child Psychology

GUIDING OUR CHILDREN—Frank T. Wilson—*Globe Book Co.*, 251 p., $2. A book for parents and teachers.

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